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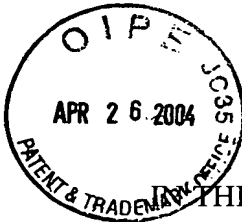
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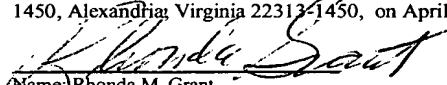
Docket No. 740116-490

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of )  
Marc ROHRSCHEIDER )  
Application No. 10/622,772 ) Art Unit: 3752  
Filed: July 21, 2003 ) Confirmation No. 4231  
For: FINGER OPERATED SPRAY PUMP ) Date: April 23, 2004

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to: Mail Stop Missing Parts, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on April 23, 2004.

  
Name: Rhonda M. Grant

**CLAIM FOR CONVENTION PRIORITY**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450


Sir:

The benefit of the filing date of the following prior foreign application in the following foreign country is hereby requested, and the right of priority provided in 35 U.S.C. § 119 is hereby claimed:

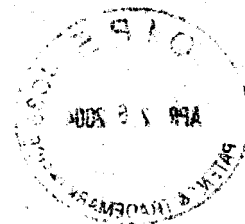
<u>COUNTRY</u>	<u>APPLICATION NO.</u>	<u>MONTH/DAY/YEAR</u>
Great Britain	02 17 866.3	August 1, 2002

In support of this claim, enclosed is a certified copy of said prior foreign application. Acknowledgment of receipt of this certified copy is requested.

Respectfully submitted,

By:   
Donald R. Studebaker  
Registration No. 32,815

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INVESTOR IN PEOPLE

The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Dated 10 July 2003

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- 1 AUG 2002



1/77

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P01/7700 0.00-0217866.3  
The Patent Office

# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

Cardiff Road  
Newport  
South Wales  
NP10 8QQ

1. Your reference

2. Patent application number

(The Patent Office will fill in this part)

0217866.3

01 AUG 2002

3. Full name, address and postcode of the or of each applicant (underline all surnames)

STEAR microParts GmbH  
HAUERT 7  
44227 DORTMUND  
GERMANY

84377 28001

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

LOW DOSE SPRAY PUMP

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

S. DUNKE  
THE COTTAGE  
GREAT FINBOROUGH  
STOWMARKET  
SUFFOLK  
IP14 3AE

Huber & Co  
St James House  
2nd Floor  
Vicar Lane  
Sheffield  
S1 2EX  
885002

Patents ADP number (if you know it)

4195293004

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

YES

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
- See note (d))

# Patents Form 1/77

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Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

S. D. R.

Date

29/7/2002

12. Name and daytime telephone number of person to contact in the United Kingdom

S. DUNNE 01449 612888

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After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

## Notes

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- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
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## **Low Dose Spray Pump**

### **Background to the Invention;**

Conventional aerosol spray finger or trigger pumps produce pressures of typically 4 Bars within a piston and cylinder arrangement. Because of the low pressure generated the liquid to be atomised must be of low viscosity. The means that large quantities of solvents such as alcohol and water are required in the formulation to lower the viscosity of the liquid and doses of typically 0.1 to 0.2g (or 100 to 200 micro litres) are the norm.

Such large doses of high-level solvent formulations lead to so called 'wet' sprays. In order to reduce the amount of solvent a higher pressure pump is required as the formulations become more viscous and more difficult to spray as the solvents are reduced. To increase the pressure in the pump either a mechanical advantage linkage is required to increase finger force or a small diameter piston is required. Additionally to decrease the dose either a shorter stroke or a smaller diameter piston is required.

Conventional pumps operate at pressures of typically 4 to 8 bars and do not lend themselves to much higher pressures as the piston/cylinder/valve arrangement is moulded in very soft and thin section plastics.

The object of the present invention is to provide a finger pump system capable of atomising small doses of liquid and producing a 'dry' spray.

### **Summary of the Invention;**

The present invention is a spray pump that generates aerosol sprays of low dose with relatively small particles and is ideally suited for formulations with reduced amounts of solvents. The sprays generated are 'dry' and ideal for applications such as perfumes, body sprays, hair sprays and other surface or space sprays.

The present invention consists of:

- 1 – A cylinder connected at one end (directly or via a connecting passageway) to an atomiser.
- 2 – A piston sealingly mounted in said cylinder.
- 3 – A Liquid reservoir.

4 – Passageway means for transferring liquid from said reservoir to cylinder.

5 – Valve means to prevent liquid transferring from cylinder to reservoir.

6 – Actuation means to move piston relative to cylinder. (The spray stroke)

Biased means to return piston to its pre-actuated position (The return stroke) may be used.

Said biased means may be a spring.

Passageway means may be within said piston connected at one end to said liquid reservoir either directly or via a dip tube (the inlet) and at the other end to said cylinder (the exit). Said one-way valve may be mounted at the exit end of the piston passageway, at the entry to the piston passageway or at any position in the passageway or any position in the dip tube if one is used.

Said piston with passageway within may be rigidly fixed to said reservoir. In such an embodiment the cylinder body containing the atomiser may be used as the actuator.

Said cylinder may be connected to said reservoir via a passageway means and valve means. In such a case the actuation means may be the solid piston and may have return stroke biased means. Said cylinder may be a T piece having the three arms respectively connected to the reservoir, atomiser and sealingly mounted piston.

Said actuator may be actuated by the finger.

Said actuator may be connected to a trigger via a mechanical advantage linkage.

Said atomiser may be of the swirl chamber type or the double jet impinger type or any other mechanical break up nozzle.

Said atomiser may produce a non-atomised jet of liquid. Such a nozzle may be a  
Said one-way valve may be of the cylinder, disk or ball type and may include a biased means.

A second one-way valve may be located in between the atomiser and cylinder to prevent air ingress to the cylinder during the return stroke.

A filter may be located behind the atomiser.

The liquid reservoir may be a collapsible bag. Said collapsible bag may be the laminated type to prevent the ingress of air (oxygen).

The liquid reservoir may be a rigid bottle in which case a dip tube may be used.

The liquid reservoir may be a long tube small enough in diameter to prevent air bubbles forming within the liquid.

The liquid reservoir may be a rigid tube with sealing and movable plunger or piston at one end connected to said piston at the other.

The piston diameter is typically 1 mm to 3 mm and preferably 1.5 to 2.5 mm..

The seal between piston and cylinder may be an 'O' ring.

The seal between piston and cylinder may be a solid seal mounted at the piston end.

Preferably the dose to be sprayed is typically between 10 and 100 micro litre.

Preferably the mass mean particle diameter produced is between 5 and 100 micrometers.

The operating pressure is between 10 and 400 Bars and preferably between 40 and 200 Bars.

### Figures

Figure 1 shows one embodiment of the Invention. A rigid reservoir 1 contains liquid 2. A piston 3 is fixed to a reservoir top 4, which is sealingly mounted on reservoir 1. An actuator 5 is fixed to said piston 3 and is sealed by a seal 6 forming a cylinder 10. The actuator has an atomiser 7 mounted at right angles to the said cylinder 10 and connected by a connecting duct 10a. A return spring 9 is located in between top 4 and actuator 5. A one-way valve 8 is mounted on top on piston 3.

To operate the pump finger pressure is applied at position 11. Liquid within cylinder 10 is forced under pressure out via atomiser 7 creating a spray (the spray stroke). One-way valve 8 prevents liquid from returning to reservoir 1 during spraying. When finger pressure is removed spring 9 returns actuator 5 to it's normal position (the return stroke) and in so doing liquid 2 is sucked up dip tube 12 into cylinder 10 via one-way valve 8.

Top 4 is arranged in such a manner that it allows air to enter reservoir 1 as liquid 2 is used up during the return stroke.

In Figure 2 the same device as shown in Figure 1 is shown with the addition of a second one-way valve 14 located behind atomiser 7 to prevent air ingress into cylinder 10 during the return stroke.

In Figure 3 the same device as shown in Figure 2 is shown with the addition of a filter 19 located behind atomiser 7 to prevent atomiser 7 from becoming blocked during the spray stroke.

In Figure 4 the liquid is stored in a collapsible bag 15. Said bag 15 is placed within a rigid container 16 which has an air opening 17. Said bag may be of single layer or laminated construction.

In Figure 5 the atomiser 20 is in line with the cylinder 10. Finger pads 22 are located on the actuator for ease of use.

It must be understood that other embodiments not shown in Figures are possible.

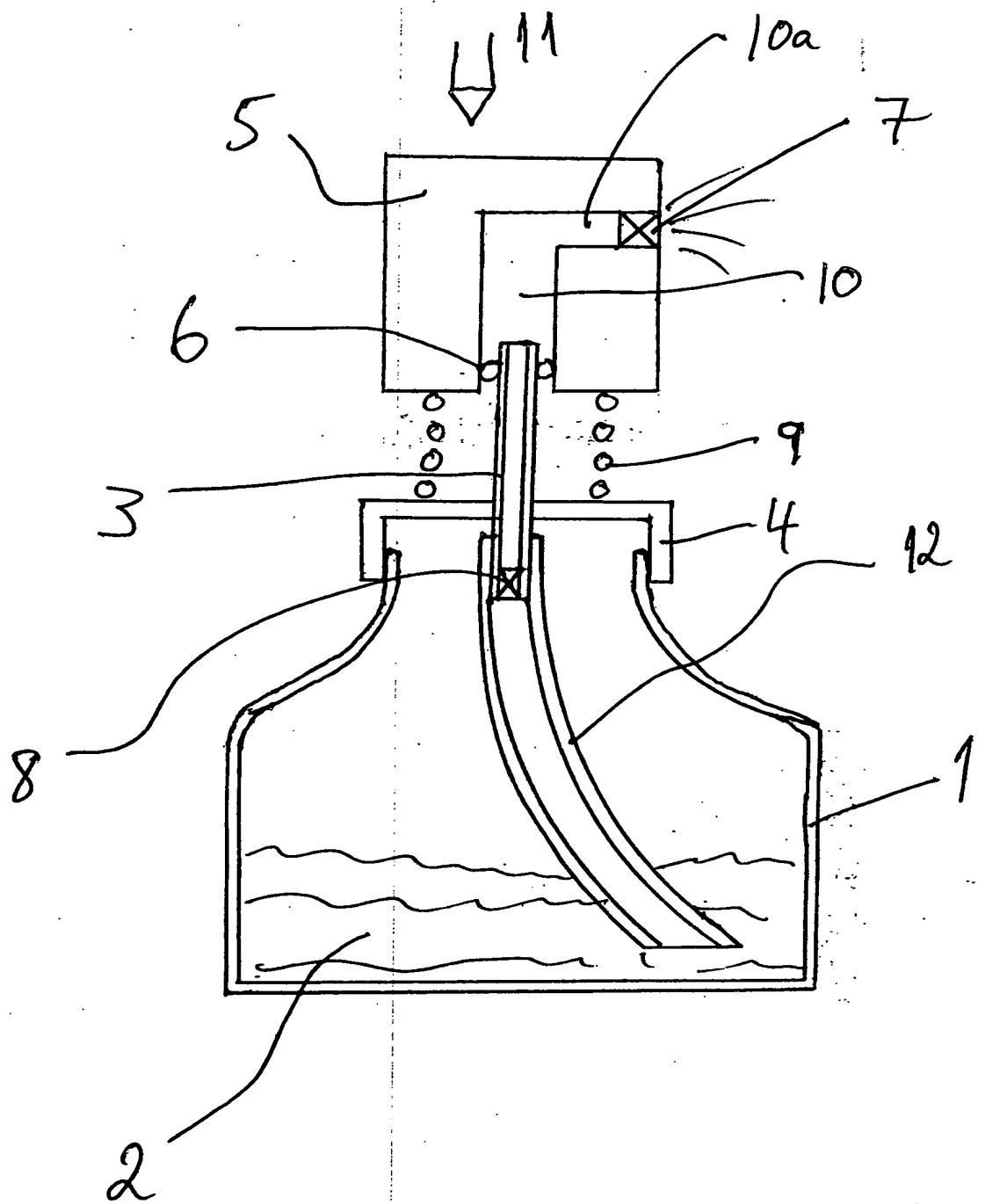


Figure 1

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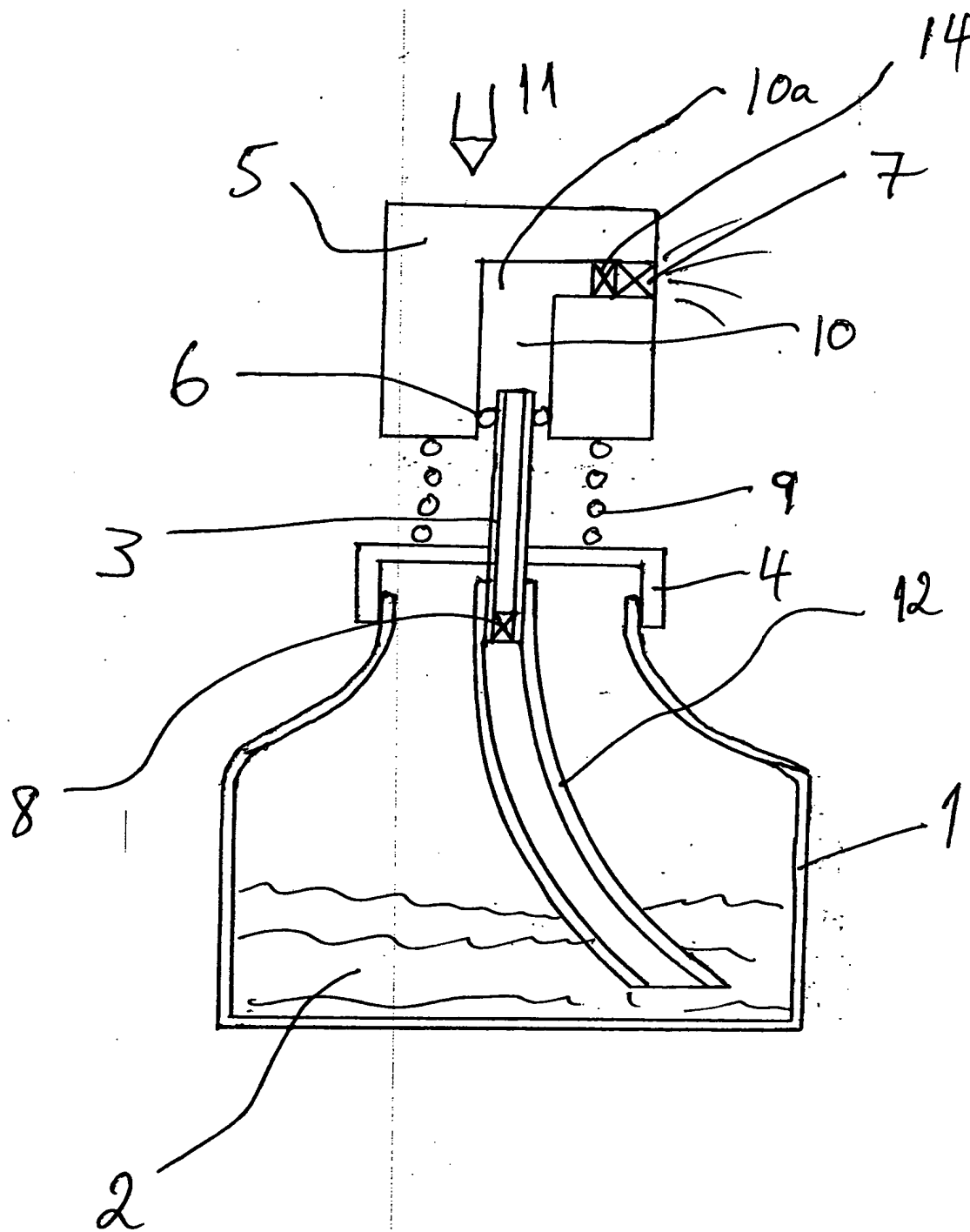


Figure 2

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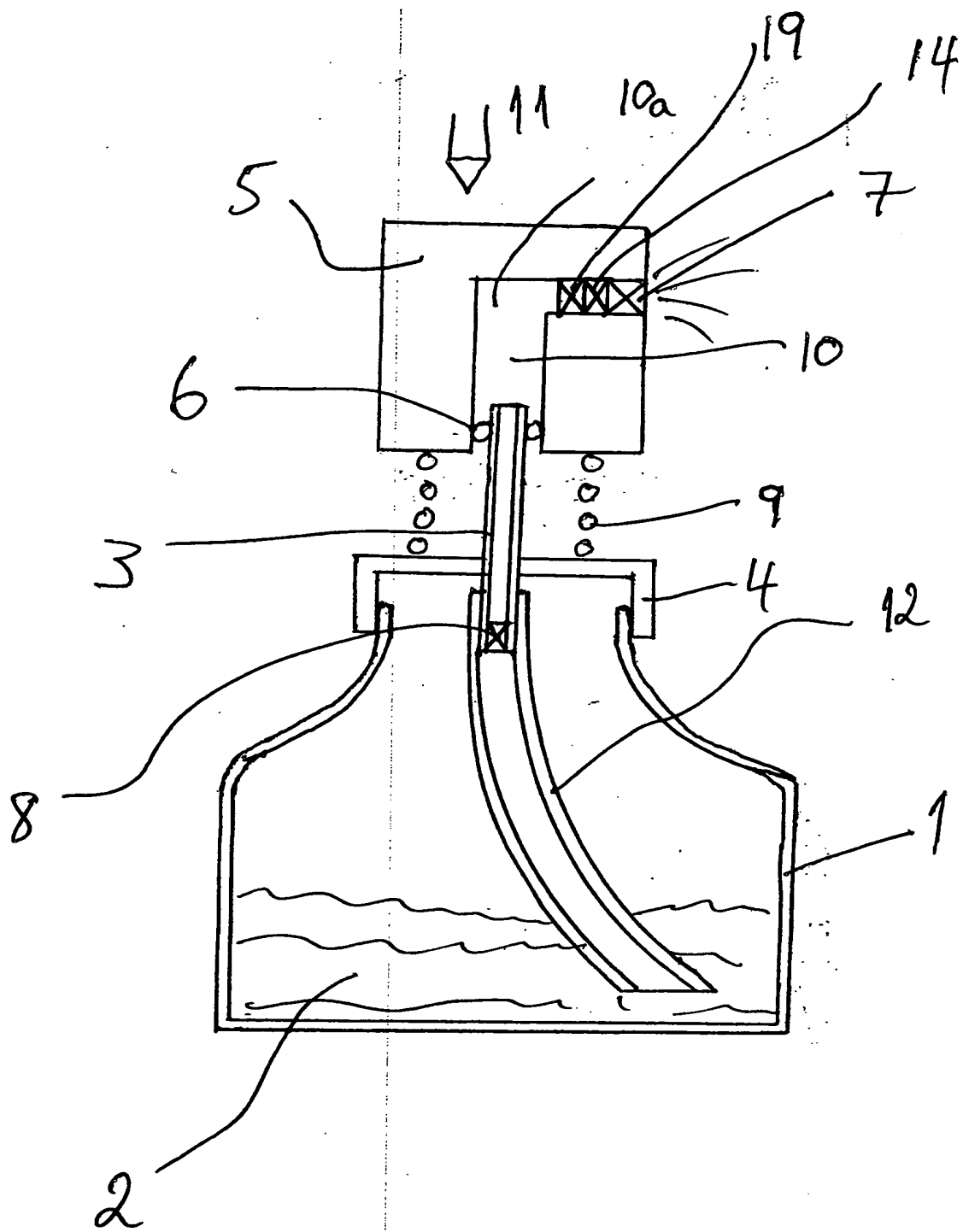


Figure 3

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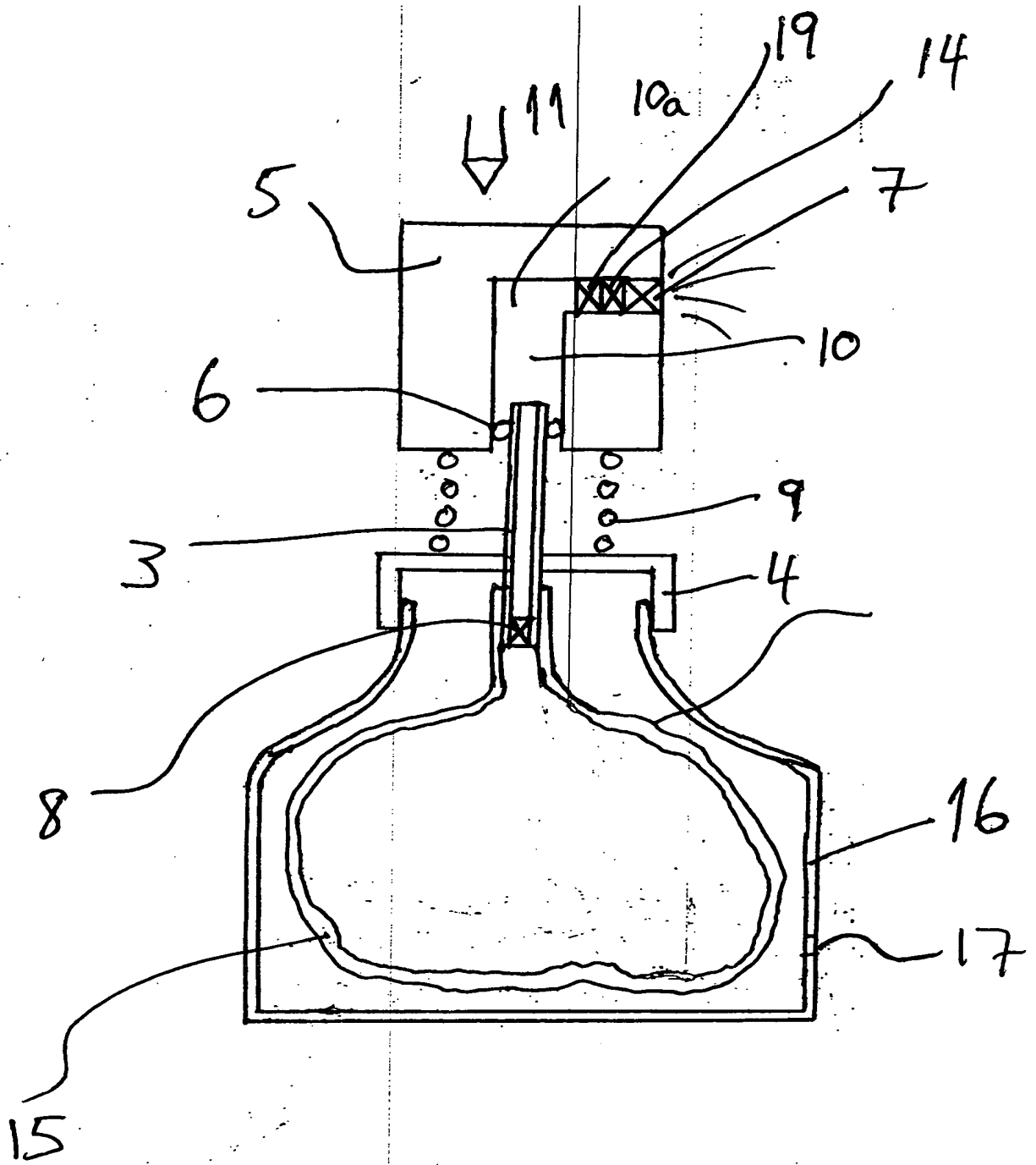


Figure 4

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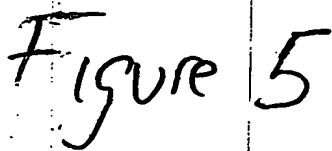


Figure 5

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